d) a jacket disposed about the at least one temperature sensor and in part disposed about a periphery of the two electrodes adjacent to the at least one temperature sensor.

38. The device of claim 37 wherein the jacket is an electrically insulating material.

39. An electrophysiology device, comprising:

a) an elongated shaft having a proximal end, a distal end, and a distal shaft section;

b) a plurality of tubular coil electrodes on an exterior portion of the distal shaft section having an interelectrode spacing of about 1 mm to not greater than 3 mm;

c) at least one temperature sensor on an exterior portion of the distal shaft section, being positioned so that the temperature sensor is disposed between two adjacent electrodes;

d) one or more electrical conductors electrically connected to the at least one temperature sensor, at least partially embedded and helically disposed within a wall of the elongated shaft.

REMARKS

In the aforesaid Office Action, claim 22 was rejected under 35 U.S.C. § 112, second paragraph, claims 1, 2, 16, 17 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. (5,769,847) in view of Nashef et al. (5,682,899),

claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Nashef et al. and further in view of Fleischman (5,885,278), claims 9-15, 18-22, 31, 32, and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Nashef et al. and further in view of Littmann et al.(5,706,809), claims 23-28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Littmann et al. Applicant notes with appreciation the indication that claims 7 and 33 would be allowable if rewritten in independent form including all the limitations of the base and intervening claims, and the indication that claim 34 is allowed. Claims 1, 2, 6-29 and 31-35 are pending.

The Examiner rejected claim 22 under 35 U.S.C. § 112, second paragraph. Applicant has amended claim 22 to obviate the rejection.

The Examiner rejected claims 1, 2, 16, 17 and 29 under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Nashef et al., and claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Nashef et al. and further in view of Fleischman, and claims 9-15, 18-22, 31, 32, and 35 under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Nashef et al. and further in view of Littmann et al., stating the basic device is disclosed by Panescu et al., and Nashef et al. discloses the use of a metal band about a temperature sensor to improve its performance. However, the references do not disclose or suggest an electrophysiology device having tubular coil electrodes having an interelectrode spacing of about 1 mm to not greater than 3 mm, as required by claims 1, 18, 20 and 23. The Examiner states, regarding claim 8, that the use of helical coil electrodes would have been obvious design

expedient in light of Fleischman's teaching at col. 8, lines 31-51. However, Applicant's device having flexible coiled electrodes with small interelectrode spacing provides a flexible maneuverable device for better conformance to the surfaces of the patient's tissue for improved sensing and lesion formation. The combination of the flexible coil electrodes with temperatures sensors between the shortly spaced electrodes is not disclosed or suggested by the references. Panescu et al. specifically discloses that the electrodes are rigid electrode solid rings 30, and that the rigid electrodes have a minimum spacing of 3.3 mm (2.5 times the electrode diameter (2.5 x 1.3 mm)) up to a spacing of 8.3 mm. There is no teaching or suggestion in Panescu to provide flexible coil electrodes with a limited, short interelectrode spacing with temperature sensors between the shortly spaced electrodes. Although Fleischman discloses the use of coil electrodes, there is no suggestion to limit the coiled electrode interelectrode spacing for improved sensing and ablation. In Fleischman, the coil electrodes are provided on a curved loop structure, which Fleischman discloses provides resilient support to establish and maintain contact between the electrode and the tissue (col. 8, lines 10-15), whereas Panescu et al. discloses that the flexible shaft between the rigid electrode solid rings 30 is flexed to bring the electrodes into intimate contact with the heart wall (col. 6, lines 8-10). Thus, there is no suggestion to provide flexible coil electrodes in Panescu et al, together with a limited, short interelectrode spacing of not greater than 3 mm.

Moreover, the references do not disclose or suggest an electrophysiology device having electrical conductors at least partially embedded and helically disposed within a wall of the device shaft and electrically connected to the at least one temperature sensor,

as required by Applicant's claims as amended. Panescu et al. and Nashef et al., disclose placing the electrical conductors of the temperature sensors within the lumen of the shaft, and not helically disposed and partially embedded in the wall of the shaft. The Examiner states, that as to claims 9-15, 18-22, 31, 32 and 35, Littmann et al. discloses the use of braided helical conductors and the particular core structure, and that it would have been obvious to the skilled artisan to incorporate these features in the Panescu et al. device to render it more flexible and maneuverable. However, Littmann et al. does not disclose braided helical conductors electrically connected to a temperature sensor, as required by Applicant's claims. Littmann et al. discloses electrical conductors electrically connected to electrodes on the device, and separate strands braided into the shaft wall. Moreover, regarding claims 12 and 13, Littmann et al. does not disclose or suggest including a jacket around the core member and helically braiding electrical conductors into the core member jacket.

The Examiner further states that various metals are disclosed for use as the heat conducting layer 19 as set forth in col. 7, lines 3-16. in Nashef et al. However, the disclosure at col. 7, lines 3-16 of Nashef et al. relates to heat conducting material layer 39 disposed about heating means 35 and temperature sensing means 32. Nashef et al. does not disclose that heat conducting layer 19 on the first temperature sensing means 20 is made of metal as required by Applicant's claims.

Moreover, claims 6 and 29 require a jacket disposed on and about the metal band. The Examiner states that Nashef et al. discloses the use of an insulating jacket as set forth in col. 13, lines 46-48. However, the disclosure at col. 13, lines 46-48 of Nashef et al. is

discussing an insulating material layer on the heat transfer device and not on the heat conducting layer 19 on the first temperature sensing means 20. The insulating material layer is coating the heating means, and not the heat conducting metal bushing. Therefore, the references do not disclose or suggest a jacket disposed on and about a metal band disposed about a temperature sensor.

The Examiner rejected claims 23-28 under 35 U.S.C. § 103(a) as being unpatentable over Panescu et al. in view of Littmann et al., stating that it would have been obvious to modify Panescu et al. to incorporate the features of Littmann et al., and such a modification would inherently create electrodes having diameters within the claimed range. However, Applicant's claims require electrode diameters of 1 to 1.22 mm, whereas Panescu et al. discloses a minimum diameter of about 1.35 mm. Decreasing the outer diameter of the catheter shaft to the ranges disclosed in Littmann et al. does not inherently decrease the diameter of the electrodes thereon to within the claimed range of 1-1.22 mm, where Panescu et al. requires a minimum electrode diameter of about 1.35 mm. The Examiner further states that Panescu et al. discloses electrode spacing of any distance less than 2.5 times the electrode diameter which would include the claimed range of 1 to 2 mm. Applicant's claims require an electrode spacing of about 1 mm to not greater than 3 mm. In contrast, Panescu et al. discloses electrode spacing of not greater than about 3.3 mm (2.5 times the minimum electrode diameter). Thus, Panescu et al. does not disclose limiting the electrode spacing to not greater than 3 mm as required by Applicant's claims. The only motivation to so reduce the shaft and electrode outer diameter, in combination

with flexible coil electrodes shortly spaced by not greater than 3 mm, with temperature sensors therebetween, is in the Applicant's specification.

Applicant submits that the pending claims as amended define patentable subject matter and respectfully requests consideration and early allowance thereof.

Respectfully submitted,

By: _____
Priscilla Mark
Registration No. 41,970

Heller Ehrman White & McAuliffe LLP
525 University Avenue, Suite 1100
Palo Alto, CA 94301-1900
Telephone: (650) 324-7000
Direct Dial: (650) 324-7184
Facsimile: (650) 324-0638

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